

CLAIMS

1. An apparatus for processing trading orders, said apparatus comprising a central server connectable to a plurality of terminals on which user orders are to be entered, wherein said central server comprises:

5 communication means for receiving user orders from said terminals via a network;

first storage means for storing received user orders as an array whose elements define a particular first resource ordered by a particular user;

second storage means for storing an array of coefficients each representing the proportion of a particular order that is to be satisfied; and

10 processing means for retrieving said orders from said first storage means, calculating an optimized set of values of said coefficients with respect to at least one predetermined, adjustable constraint and at least one predetermined, adjustable criterion, and storing said optimized coefficient values in said second storage means,

said communication means also being for transmitting the processed orders and their
15 respective coefficients.

2. An apparatus according to claim 1, wherein said at least one constraint includes that the value of each of said coefficients is less than or equal to 1 and greater than or equal 0.

3. An apparatus according to claim 1 or 2, wherein, said processing means is adapted to process orders such that a designated user takes the opposite position to each other user order by agreeing
20 to exchange a proportion of the ordered first resource for a second resource, where said proportion corresponds to the optimized coefficient for that order.

4. An apparatus according to claim 3, wherein said at least one constraint includes that if all orders were to be completed, in proportion to their respective coefficients, the designated user's holdings arising from the processed orders would be only non-negative amounts of each resource, including after
25 maturation of all simple derivatives and options to trade resources in the future.

5. An apparatus according to claim 3 or 4, wherein said at least one criterion includes maximizing the revenue of said designated user, in terms of a particular simple resource, based on an exchange rate.

6. An apparatus according to any one of the preceding claims, wherein said central server

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further comprises third storage means for storing an array of data representing the current exchange rate between each resource and at least one other resource, and wherein said processing means is further for retrieving exchange rate data from said third storage means.

7. An apparatus according to any one of the preceding claims, wherein said at least one
5 criterion includes maximizing the volume given by the sum of the absolute values of the components of all orders that are satisfied, partially or in full, in terms of a particular simple resource at a given exchange rate.

8. An apparatus according to any one of the preceding claims, wherein said processing means is adapted to optimize the values of said coefficients by successively applying respective criteria in a cascaded manner.

10 9. An apparatus according to claim 6, further comprising means to specify the sequence of said cascaded criteria.

10. An apparatus according to any one of the preceding claims, wherein said processing means is adapted to apply, in sequence, each one of a plurality of predefined linear programming routines, or convex programming routines, or standard combinatorial optimisation techniques, to optimize said coefficients until
15 one of the following events occurs:

- a specified maximum period of time elapses;
- an optimal solution is found.

11. An apparatus according to claim 10, wherein if a specified maximum period of time elapses before an optimal solution is found, a consistent sub-optimal solution is used to obtain the optimized set of
20 coefficient values.

12. An apparatus according to any one of the preceding claims, wherein said processing means is adapted to optimize said coefficients for batches of received orders.

13. An apparatus according to claim 12, wherein said processing means is adapted to determine the end of a batch by a preset interval of time having elapsed since the start of that batch.

25 14. An apparatus according to claim 12, wherein said processing means is adapted to determine the end of a batch by the total order value exceeding a threshold value.

15. An apparatus according to any one of claims 12 to 14, adapted to carry forward orders not satisfied, completely or partially, in one batch to the next batch.

16. An apparatus according to any one of claims 12 to 15, adapted to remove from said first

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storage means orders not satisfied, completely or partially, after a preset length of time from submission of those orders.

17. An apparatus according to claim 16, wherein said preset length of time for each order is specified by the relevant user.

5 18. An apparatus according to any one of the preceding claims, wherein unsatisfied orders are removed from said first memory means at the request of a user.

19. An apparatus according to any one of the previous claims, wherein at least one user order stored in said first storage means specifies a particular second resource offered in exchange for said first resource to define a resource flow.

10 20. An apparatus according to any one of the preceding claims, wherein at least one user order stored in said first storage means orders said first resource at a prevailing market exchange rate.

21. An apparatus according to any one of the preceding claims, wherein a resource in at least one order is a compound resource.

15 22. An apparatus according to any one of the preceding claims, wherein at least one of said terminals is connected to said central server via a sub-server which aggregates orders from users.

23. An apparatus according to any one of the preceding claims, wherein said communication means is adapted to transmit orders using TCP/IP.

20 24. An apparatus according to claim 6 or to any claim appendant to claim 6, wherein said processing means computes and updates the exchange rates in said third storage means based on the satisfied order flow.

25. An apparatus according to any one of the preceding claims, wherein instruments being traded are financial, such as currencies, securities, and futures on the value of commodities.

26. An apparatus according to any one of the preceding claims, wherein said communication means transmits said processed orders and their coefficients to a further apparatus for settlement of said
25 orders.

27. A computer terminal comprising:

communication means for receiving the processed orders and their respective coefficients from an apparatus according to any one of claims 1 to 25; and

a device for triggering transfer of resources in accordance with the filled part of each order specified
30 by the respective coefficient.

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28. A method for processing trading orders comprising the steps of:
receiving from users orders each specifying a particular first resource ordered by a particular user
and storing them as an array in a first storage means;
processing said orders retrieved from said first storage means to calculate a set of coefficients each
5 representing the proportion of a particular order that is to be satisfied;
optimizing the values of said coefficients with respect to at least one predetermined, adjustable
constraint and at least one predetermined, adjustable criterion;
storing said optimized coefficient values in a second storage means; and
outputting the processed orders and their respective coefficients.

10 29. A method according to claim 28, wherein said at least one constraint includes that the
value of each of said coefficients is less than or equal to 1 and greater than or equal to 0.

30. A method according to claim 28 or 29, wherein a designated one of said users takes the
opposite position to each other user order by agreeing to exchange a proportion of the ordered first resource
for a second resource, where said proportion corresponds to the optimized coefficient for that order.

15 31. A method according to claim 30, wherein said at least one constraint includes that if all
orders were to be completed, in proportion to their respective coefficients, the designated user's holdings
arising from the processed orders would be only non-negative amounts of each resource, including after
maturation of all simple derivatives and options to trade resources in the future.

32. A method according to claim 30 or 31, wherein said optimizing step includes as one
20 criterion maximizing the revenue of said designated user, in terms of a particular simple resource, based on an
exchange rate.

33. A method according to any one of claims 28 to 32, wherein a third storage means is for
storing an array of data representing the current exchange rate between each resource and at least one other
resource, said method further comprising the step of retrieving exchange rate data from a third storage
25 means for use in optimizing said coefficients.

34. A method according to any one of claims 28 to 33, wherein said optimizing step includes
maximizing the volume given by the sum of the absolute values of the components of all orders that are
satisfied, partially or in full, in terms of a particular simple resource at a given exchange rate.

35. A method according to any one of claims 28 to 34, wherein said optimizing step further
30 comprises successively applying respective criteria in a cascaded manner to obtain optimized values of said

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coefficient.

36. A method according to claim 35, further comprising the step of specifying the sequence of said cascaded criteria.

37. A method according to any one of claims 28 to 36, wherein said optimizing step further
5 comprises applying, in sequence, each one of a plurality of predefined linear programming routines, or convex programming routines, or standard combinatorial optimisation techniques, to optimize said coefficients until one of the following events occurs:

a specified maximum period of time lapses;

an optimal solution is found.

10 38. A method according to claim 37, wherein if a specified maximum period of time elapses before an optimal solution is found, a consistent sub-optimal solution is used as the optimized set of coefficient values.

39. A method according to any one of claims 28 to 38, wherein said processing step further comprises retrieving said orders from said second storage means in batches, and is followed by said
15 optimizing step to obtain optimized coefficient values for said batch of orders.

40. A method according to claim 39, wherein the end of a batch is determined by a preset interval of time since the start of that batch.

41. A method according to claim 39, wherein the end of a batch is determined by the total order value exceeding a threshold value.

20 42. A method according to any one of claims 39 to 41, further comprising the step of forwarding orders in one batch that are not satisfied, completely or partially, following the optimizing step, to be processed in the next batch.

43. A method according to any one of claims 39 to 42, further comprising the step of removing orders from said second storage means that have not been satisfied, completely or partially, after a preset
25 length of time from submission of those orders.

44. A method according to claim 43, wherein said preset length of time for each order is specified by the relevant user.

45. A method according to any one of claims 28 to 43, further comprising the step of deleting from said second memory means unsatisfied orders at the request of a user.

30 46. A method according to any one of claims 28 to 45, wherein at least one user order stored

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in said first storage means specifies a particular second resource offered in exchange for said first resource to define a resource flow.

47. A method according to any one of claims 28 to 46, wherein at least one user order stored in said first storage means orders said first resource at a prevailing market exchange rate.

5 48. A method according to any one of claims 28 to 47, wherein a resource in at least one order is a compound resource.

49. A method according to any one of claims 28 to 48, further comprising the step of communicating orders entered on a plurality of terminals to a central server for processing said orders, via a network.

10 50. A method according to claim 49, further comprising the steps of aggregating in a sub-server orders from users before communicating them to said central server.

51. A method according to claim 49 or 50, wherein said communication is done by means of TCP/IP.

15 52. A method according to any one of claims 28 to 51, further comprising the step of computing updated exchange rates based on the satisfied order flow and storing said updated exchange rates in said third storage means.

53. A method according to any one of claims 28 to 52, wherein said instruments being traded are financial, such as currencies, securities, and futures on the value of commodities.

20 54. A method according to any one of claims 28 to 53, further comprising the step of transmitting the result of said outputting step to a means for settlement of said orders.

55. A method according to any one of claims 28 to 54, wherein a proportion of the value of an order accepted at greater than a prevailing exchange rate is refunded to the respective user.

56. A method according to any one of claims 28 to 54, wherein a designated user receives a revenue limited by, or predetermined as, a fraction of the total traded volume.

25 57. A method according to any one of claims 28 to 56, comprising the step of controlling a process using the processed orders and their coefficients output in said outputting step.

58. A computer-readable storage medium having recorded thereon a program containing code components that, when loaded into a computer and executed, will cause the computer to operate according to the method of any one of the preceding method claims.

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